HISTORY, EPIDEMIOLOGY, AND IMPORTANCE OF ATRIAL FIBRILLATION

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"When the pulse is irregular and tremulous and the beats occur at intervals, then the impulse of life fades; when the pulse is slender (smaller than feeble, but still perceptible, thin like a silk thread), then the impulse of life is small."

Huang Ti Nei Ching Su Wên

Presenting symptoms in emergency admissions with atrial fibrillation

Dyspnoea—52%
Chest pain—34%
Palpitation—26%
Dizziness or syncope—19%

Atrial fibrillation is the commonest sustained disorder of cardiac rhythm. When it is present many prognostic and therapeutic implications exist as overall morbidity and mortality increase appreciably. Despite this, atrial fibrillation is sometimes regarded as a fairly trivial and unimportant disorder and is often neglected, probably because many patients have few symptoms. In fact, some patients with chronic atrial fibrillation may require long term treatment with potent antiarrhythmic and anticoagulant drugs, which may have important pharmacological interactions and adverse effects. In addition, treatment differs importantly for chronic and paroxysmal atrial fibrillation and for atrial fibrillation, atrial flutter, and the other supraventricular arrhythmias.

Atrial fibrillation is encountered in many clinical settings. It may, for example, be discovered incidentally in an asymptomatic patient, develop in a patient who merely has a chest infection, or be found in a patient with a ventricular rate of 200 beats/min who is too lightheaded to stand up. Patients admitted with atrial fibrillation may have many cardiorespiratory symptoms and clinical features, including syncope and stroke.

A brief history

History of atrial fibrillation

Adams, 1827
Probably the first to recognise the condition clinically but as a "sign of mitral stenosis"
Hope, 1839
Identified irregular pulse in association with mitral stenosis—exercise worsened the total irregularity, whereas it abolished an intermittent pulse
Marey, 1863
Published a pulse tracing of atrial fibrillation from a patient with mitral stenosis
Vulpian, 1874
Observed atrial fibrillation in vivo (dog)
Engelman, 1894
Reported atrial fibrillation caused by multiple foci in the atria
Einthoven, 1900
Invented the electrocardiograph
Lewis, 1909
Recorded atrial fibrillation with electrocardiograph; studied mechanisms of the condition
Rothenberger and Winterberg, 1909
Identified "arrhythmia perpetua" and "fibrillation of the auricles"
Bouilland, 1935
Found that digitalis reduced the ventricular rate dramatically even though irregularity of pulse persisted
Lown, 1969
Recommended cardioversion of atrial fibrillation

Perhaps the earliest description of atrial fibrillation is in *The Yellow Emperor's Classic of Internal Medicine* (Huang Ti Nei Ching Su Wên). The legendary emperor physician is believed to have ruled China between 1696 and 2598 BC. The poor prognosis associated with chaotic irregularity of the pulse was clearly acknowledged by most of the ancient physicians, but in recorded history, William Harvey in 1628 was probably the first to describe "fibrillation of the auricles" in animals.

In clinical practice and with the aid of Laénnec's recently invented stethoscope, Robert Adams reported in 1827 the association of irregular pulses with mitral stenosis; in 1863, Etienne Marey published a pulse tracing from such a patient. Other early descriptions of atrial fibrillation and its importance were published early this century by Sir James Mackenzie and Heinrich Hering.

The discovery of the therapeutic properties of digitalis leaf (*Digitalis purpurea*) in 1785 by William Withering brought some relief to patients with severe heart failure. It is interesting that Withering recorded a patient who had a weak, irregular pulse that became "more full and more regular" after five draughts containing *Fol Digital Purp oz iv*. In 1935 Jean Baptiste Bouilland said that he considered digitalis to be "a sort of opium for the heart."

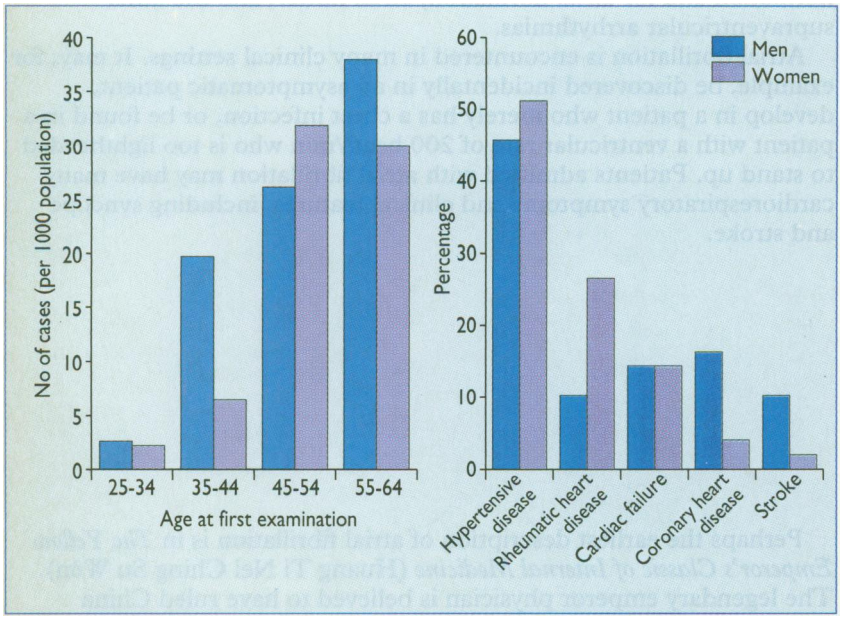
Left: William Withering. Right: (top) William Einthoven; (bottom) Thomas Lewis.

The main diagnostic breakthrough was the invention of the electrocardiograph by William Einthoven in 1900. A close friend of Einthoven, Sir Thomas Lewis at University College Hospital, London, was the first to record an electrocardiogram in a patient with atrial fibrillation.

The exact mechanisms and importance of atrial fibrillation remained controversial (Lewis and Mackenzie had disagreed about these issues) until 1970, when Bootsma and coworkers, with the aid of computers, concluded that the totally irregular response of the ventricles was due to the effect of "randomly spaced atrial impulses of random strength reaching the atrioventricular node from random directions."

The epidemiological importance of atrial fibrillation as an important precursor of cardiac and cerebrovascular death was investigated in detail in the Framingham study by William Kannell and colleagues in 1982. Over the past 10 years, awareness has increased of the hazards of sustained non-rheumatic atrial fibrillation and the benefits of prophylaxis against thrombosis in preventing cerebral thromboembolism.

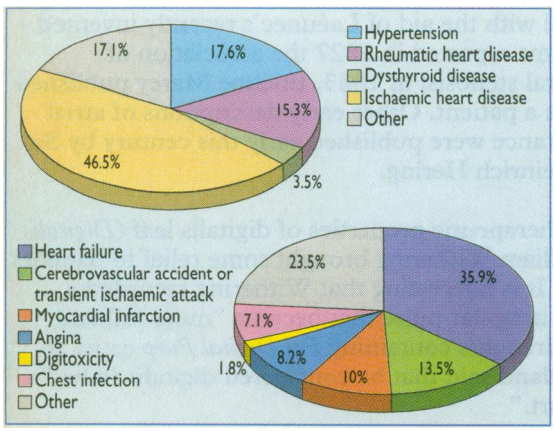
Epidemiology



Left: Cumulative incidence of atrial fibrillation over 22 years. Right: Previous cardiovascular disease in patients with atrial fibrillation.

Atrial fibrillation is common in the community, affecting up to 5% of people aged 75 or over. It is a major reason for emergency admissions and cause of cardiovascular deaths. Thus most clinicians in hospital and general practice will participate in managing such patients. As the prevalence of the condition increases with age, atrial fibrillation will become increasingly common in the increasingly aging population.

Epidemiological studies have shown that atrial fibrillation is fairly uncommon in people aged under 50 years but is found in 0·5% of people aged 50-59, increasing to 8·8% at age 80-89. Furthermore, the arrhythmia may be either chronic or paroxysmal. In the Framingham study, hypertension, cardiac failure, and rheumatic heart disease were the commonest precursors of atrial fibrillation. Up to a third of patients with atrial fibrillation, however, may have idiopathic or "lone" atrial fibrillation, where no precipitating cause can be identified and no evidence of structural heart disease exists.



Top: Causes of atrial fibrillation among emergency admissions to hospital. Bottom: Presenting clinical features on admission.

Atrial fibrillation is more common in hospital practice than in general practice, being present in up to 7% of emergency medical admissions to district general hospitals. The commonest causes in Western countries include coronary heart disease, hypertension, and rheumatic and non-rheumatic valve heart disease. The commonest presenting features included heart failure, stroke, chest pain (including myocardial infarction or angina), and respiratory diseases. By contrast, in developing countries rheumatic heart disease is by far the commonest cause of atrial fibrillation.

In general practice, while atrial fibrillation is the commonest cardiac arrhythmia, in many patients the condition remains unrecognised. In a screening programme in patients aged 65-74, 3·4% were found to have atrial fibrillation (J R Coope, unpublished observations). A strong case for long term anticoagulation could be made in up to 80% of these patients. The feasibility of diagnosing and managing these patients presents a clinical challenge for primary health care teams.

Importance

All doctors and hospital and primary care nurses must be trained to detect and manage atrial fibrillation

Importance of treating atrial fibrillation

To relieve symptoms of congestive heart failure, hypotension, or angina that can be directly attributed to a rapid heart rate

To improve overall cardiac function

To improve exercise tolerance

To reduce the risk of thromboembolism and stroke

Summary

Atrial fibrillation

- Common arrhythmia with different causes, clinical presentations, and treatment options
- Wide variations in management strategies
- Three phases of management:
  Search for underlying cause
  Control arrhythmia and reduce thromboembolic risk
  Consider cardioversion to sinus rhythm

Key references

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Kannel WB, Abbott RD, Savage DD, McNamara PM. Epidemiological features of chronic atrial fibrillation. The Framingham study. *N Engl J Med* 1982;**306**:1018-22

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Because of the serious implications of atrial fibrillation, clinicians in all specialties, as well as hospital and primary health care nurses, must be adequately trained in its detection and management. The sudden onset of fast atrial fibrillation may precipitate overt heart failure, particularly if left ventricular function is already compromised by coexisting heart disease, such as valve or ischaemic heart disease. Less dramatic presentations of atrial fibrillation include palpitations, dyspnoea, angina, and general fatigue or lethargy. Symptoms may be more pronounced on exercise, with a greatly limited exercise tolerance.

More important, however, is the finding that non-rheumatic atrial fibrillation increases the risk of stroke by a factor of five. The risk of stroke in someone with atrial fibrillation is about 5% a year, and epidemiological evidence suggests that this risk increases with age, blood pressure, and other evidence of heart disease. Atrial fibrillation may also increase the risk of recurrent stroke. In the Oxfordshire community stroke project, patients with acute stroke and atrial fibrillation also had a significantly higher 30 day mortality than patients in sinus rhythm (23% *v* 8%).

Therapeutic benefits from treating atrial fibrillation have been proved. The main priorities are to ameliorate the adverse haemodynamic effects of the poor cardiac output related to the arrhythmia and to reduce thromboembolic risks of atrial fibrillation. Electrical and pharmacological cardioversion to, and the maintenance of, normal sinus rhythm remains the optimal strategy to enhance cardiac performance and reduce the thromboembolic risk. As cardiac function and exercise tolerance may improve after cardioversion, cardioversion should be increasingly considered. The use of this option, however, varies among clinicians and among medical centres, as does the use of anticoagulants before and after cardioversion.

The role of anticoagulant drugs as prophylaxis against thromboembolism in patients with atrial fibrillation has attracted much interest recently. The results of several recent, large, prospective randomised controlled trials consistently show that anticoagulation reduces the risk of strokes by about two thirds without a significant excess of adverse effects. These studies have therefore established the role of oral anticoagulant drugs in atrial fibrillation. Physicians continue to be reluctant, however, to introduce this treatment, with an appreciable proportion of patients still not being given anticoagulant drugs despite an absence of contraindications.

The sources of the data presented in the illustrations are: Kannel *et al*, *N Engl J Med* 1982;**306**:1018-22 for the graphs of incidence of atrial fibrillation and previous cardiovascular disease; and Lip *et al*, *Br Heart J* 1994;**71**:92-5 for the pie charts of causes of atrial fibrillation among emergency admissions to hospital and presenting clinical features on admission. The source of the information in the box on the history of fibrillation is Acierno LJ. *The history of cardiology*. New York: Parthenon Publishing, 1994. The painting of William Withering is reproduced with permission of the University of Birmingham.

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The grateful patients of Arles

The papers seemed to be full of the misdemeanours of doctors. A diagnosis had been missed here. An operation had gone wrong there. Some unfortunate old person had lain for hours on a trolley, waiting for admission to a ward. Another had been transferred to a hospital remote from home because no nearer bed was available. On television an angry woman raged against the arrogance of surgeons. Patients or their relatives were surging to the lawyers, seeking advice about litigation. I imagined my former colleagues cowering in their consulting rooms and surgeries, looking anxiously behind them, as they turned away from their computers and faced their patients. It was a world away from the kindly caring vocation I thought I was part of for so many years.

Shortly after I had experienced these depressing reflections we went to a delightful exhibition at the Royal Academy in London, "From Manet to Gauguin." Perceptive wealthy Swiss collectors had lent their master-pieces. It was calming and refreshing to move into this impressionistic scene of colourful gardens, sparkling rivers, and dignified men and women. Among the paintings, I noticed one by Van Gogh, labelled "Sunny lawn in a public park, Arles 1888."

On a holiday in Provence we had stayed at Arles and visited that park. I remembered that in one corner there was the bust of a grave, bearded man apparently deep in thought. On the pedestal the inscription read "Docteur J Urpar 1857-1915—La Ville d'Arles et ses malades reconnaissants"—the city of Arles and his grateful patients.

I do not wish to know more about Dr Urpar. Perhaps he had feet of clay that would be quickly uncovered by some revisionist historian, but I am happy to accept him as he was seen by his fellow townsmen. He had far less at his disposal to help his patients than his successors today, but he had the gift of inspiring respect and affection. Good doctors and grateful patients, though numerous, do not make the headlines, and most of them are probably thankful for the obscurity. The contact with the great artists of the past had restored my equanimity.—A L WYMAN *is a retired consultant physician in London*